

Massachusetts Institute of Technology
Instrumentation Laboratory
Cambridge, Massachusetts

LUMINARY Memo #23

To: Distribution
From: C. Schulenberg
Date: 22 April 1968
Subject: LUMINARY Revisions 7 and 8

Revision 7 was made to correct cusses in Revision 6 and was a good assembly, although patches are required. No significant changes were introduced into Revision 7.

Major Changes Incorporated into Revision 8

- 1) BURNBABY was modified for P63 so that CLOCKJOB does not call the Noun 62 display until after the integration has been completed and proper display information is available.
- 2) The post-landing logic for P65-P66-P67 was modified to call the subroutine REFMEF which computes and stores the touchdown IMU orientation for later use by P57.
- 3) P63 was modified to compute the value of /LAND/ from RLS. /LAND/ need no longer be initialized for the Landing.
- 4) The fixed vector WMREF was changed to the correct value, thus eliminating the need to patch this quantity when running P63. WMREF is the lunar rotation vector in reference coordinates.
- 5) P12 was modified to use RRECTCSM and VRECTCSM in place of R-OTHER and V-OTHER in the computation of the CSM orbit plane.
- 6) Coding changes were made to FINDCDUW in order to improve its performance in a peculiar case. The program documentation was also modified.
- 7) NORMLIZE was modified to compute UHYP for R10 using RRECTCSM and VRECTCSM instead of the current R and V (LM state vectors). This is consistent with the GSOP.

- 8) The Landing Radar state-vector-update routine was rewritten for increased speed and accuracy.
- 9) R10 was modified to use the single flagword bit DIDFLAG instead of the unshared unswitched erasable word DIDFLG. The altitude computation was also corrected.
- 10) The initialization of DIDFLG was removed from FRESH START.
- 11) The erasable WM was moved so that it does not overlay R10, Ascent, or Descent.
- 12) The Descent erasables were adjusted so that neither LANDTEMP nor TFF/8TMP overlay PIPTIME1. This is in anticipation of P63 being modified to use PIPTIME1 instead of PIPTIME in the IGNITION ALGORITHM.
- 13) New P57 coding was added.
- 14) Modifications were made to the autopilot to reduce fuel consumption in drifting flight when in the docked configuration.
- 15) The fast display portion of T4RUPT was restored to approximately the old configuration. The matter of the UPLINK VERB lights is still unresolved.
- 16) The lunar surface IMU compensation changes were incorporated. NBDONLY and LASTBIAS now check SURFFLAG. If it is set, compensation is done for acceleration-sensitive drift.
- 17) The PRIOCHNG was eliminated from Verb 56 and coding was added to reset the IMUSE bit if the track flag is on.
- 18) Verb 80 and 81 were modified in order to check for R32 operation. If R32 is running the operator error light is turned on.
- 19) R32 was modified to reset NOUPFLAG prior to termination.
- 20) The Update Program was changed to use bit 7 of RASFLAG instead of bit 13 of FLAGWRD5.

Statistical Summary of Revisions 7 and 8

Number of Changes

Total modification forms	30
DAP modification forms	1
Fixed memory change	+46

Types of Changes

Mandatory	17
Storage	4
Speed	1
Development	4
Non-Program	4